CLAIMS:

1. A system adapted for determining polarization dependent characteristic of an optical device under test (10) having at least one input and at least one output, wherein at least four stimulus signals (S_d-1, S_d-2, S_d-3, S_d-4), each having a characteristic identification portion and a different state of polarization, are applied to said optical device under test (10), comprising:

   - a signal receiving unit (60) adapted for receiving a response signal (R_a) from said at least one output of said device under test, and being adapted to identify each of said identification portions or at least an indication thereof within said response signal (R_a),

   - an evaluation unit (80) adapted for determining said polarization dependent characteristic of said device under test (10) by evaluating said identification portions of said received response signal (R_a).

2. The system according to claim 1,

   wherein said evaluation unit (80) is designed to provide a quantitative analysis of each of said identification portions representing a unique state of polarization within said response signal (R_a) with respect said stimulus signals.

3. A signal application unit adapted for applying at least four stimulus signals (S_b-1, S_b-2, S_b-3, S_b-4) each having a characteristic identification portion and a different state of polarization as an input to an optical device under test (10).

4. The signal application unit according to claim 3,

   further comprising a signal source unit (4) for generating said stimulus

signal (S_a), a coupler (105) for splitting said stimulus signal (S_a), a set of at least four polarization units (40-1, 40-2, 40-3, 40-4) for setting each of said split stimulus signals (S_b-1, S_b-2, S_b-3, S_b-4) into a different unique state of polarization, and a set of at least four modulation units (30-1, 30-2, 30-3, 30-4) for adding a characteristic identification portion to each of said split polarized stimulus signals (S_c-1, S_c-1, S_c-1, S_c-1).

5. The signal application unit according to claim 4,

wherein each of said modulation units (30-1, 30-2, 30-3, 30-4) is designed to apply at least one of a group comprising: phase modulation, amplitude modulation, frequency modulation to said stimulus signals (S_c).

6. A system adapted for determining polarization dependent characteristic of an optical device under test (10) having at least one input and at least one output, comprising:

- a signal source unit (4) for inputting a stimulus signal (S_a, S_b) to each of at least four polarization units (40-1, 40-2, 40-3, 40-4);
- said at least four polarization units (40-1, 40-2, 40-3, 40-4), each polarization unit setting said stimulus signals (S_b-1, S_b-2, S_b-3, S_b-4) into a unique state of polarization, wherein each of said polarization units (40-1, 40-2, 40-3, 40-4) is arranged to apply said uniquely polarized stimulus signals (S_c-1, S_c-2, S_c-3, S_c-4) to said at least one input of said device under test (10);
- at least four modulation units (30-1, 30-2, 30-3, 30-4) for attaching a characteristic identification portion to each of said uniquely polarized stimulus signals (S_c-1, S_c-2, S_c-3, S_c-4), each of said modulation units (30-1, 30-2, 30-3, 30-4) being uniquely associated with one of said polarization units (40-1, 40-2, 40-3, 40-4),

- a signal receiving unit (60, 70) adapted for receiving a response signal (R_a) from said at least one output of said device under test (10) and being adapted to identify said identification portion or at least an indication thereof within said response signal (R_a),

- an evaluation unit (80) adapted for determining said polarization dependent characteristic of said device under test (10) by evaluating said identification portions of said received response signal (R_b).

7. The system according to claim 6,

wherein each of said modulation units (30-1, 30-2, 30-3, 30-4) is designed to apply a different modulation frequency to each of said stimulus signals (S_C-1, S_C-2, S_C-3, S_C-4) that is input to said polarization units (40-1, 40-2, 40-3, 40-4).

8. The system according to claim 6 or any one of the above claims, wherein said signal receiving unit comprises at least one frequency selective filter (60) for identifying said modulation frequency of at least one of said uniquely polarized stimulus signals (S_C-1, S_C-2, S_C-3, S_C-4) as said identification portion within said response signal (R_a).

9. The system according to claim 6 or any one of the above claims, wherein said signal receiving unit comprises a sensor and a power meter (70) associated with each of said frequency selective filters (60) of said receiving unit.

10. The system according to claim 6 or any one of the above claims, wherein a number of four or more polarization units (40-1, 40-2, 40-3, 40-4) each being associated with one of said modulation units (30-1, 30-2, 30-3, 30-4) are input with said stimulus signal, each of said polarization units (40-1, 40-2, 40-3, 40-4) generating one of a set comprising four or more

distinct and unique states of polarization of said stimulus signal.

11. The system according to claim 10 or any one of the above claims, wherein said polarization units (40-1, 40-2, 40-3, 40-4) are designed such that the power of each of said polarized stimulus signals to be applied to said input of said device under test (10) attains substantially the same value.

12. The system according to claim 6 or any one of the above claims, wherein said evaluation unit (80) comprises a control unit, a memory and a user interface for solving a linear equation system that is input with values provided by said signal receiving unit which comprises a power meter (70).

13. The system according to claim 6 or any one of the above claims, wherein said signal application unit comprises a wavelength tunable laser source (4).

14. The system according to claim 6 or any one of the above claims, wherein said signal application unit comprises a further polarization unit for setting said stimulus signal into a predetermined state of polarization prior to inputting said signal to said plurality of polarization units (40-1, 40-2, 40-3, 40-4).

15. A determining system adapted for determining polarization dependent characteristic of an optical device under test (10) having at least one input and at least one output, wherein at least four stimulus signals (S_d-1, S_d-2, S_d-3, S_d-4), each having a characteristic identification and a different state of polarization, are applied to said optical device under test (10), comprising:

- a signal receiving unit (60) adapted for receiving a response signal

(R_a) from said at least one output of said device under test, and being adapted to identify signal portions, each corresponding to a respective one of the stimulus signals, within said response signal (R_a),

- an evaluation unit (80) adapted for determining said polarization dependent characteristic of said device under test (10) by evaluating said signal portions of said received response signal (R_a).

16. The determining system according to claim 15,

wherein said evaluation unit (80) is designed to provide a quantitative analysis of each of said signal portions representing a unique state of polarization within said response signal (R_a) with respect said stimulus signals.

17. The determining system according to claim 15 or any one of the above claims,

wherein said signal receiving unit (60) is adapted to identify the signal portions by identifying the characteristic identifications of the stimulus signals within said response signal (R_a).

18. A signal application unit adapted for applying at least four stimulus signals (S_b-1, S_b-2, S_b-3, S_b-4) each having a characteristic identification and a different state of polarization as an input to an optical device under test (10).

19. The signal application unit according to claim 18, comprising at least one of the features:

a signal source unit (4) for generating an initial stimulus signal (S_a), a

coupler (105) for splitting said initial stimulus signal (S_a) into at least four individual stimulus signals (S_b-1, S_b-2, S_b-3, S_b-4),

a signal source unit (4) for generating at least four individual stimulus signals (S_b-1, S_b-2, S_b-3, S_b-4),

a set of at least four polarization units (40-1, 40-2, 40-3, 40-4) for setting each of said individual stimulus signals (S_b-1, S_b-2, S_b-3, S_b-4) into a different unique state of polarization,

a set of at least four modulation units (30-1, 30-2, 30-3, 30-4) for adding a characteristic identification to each of said polarized stimulus signals (S_c-1, S_c-1, S_c-1, S_c-1).

20. The signal application unit according to claim 19,

wherein each of said modulation units (30-1, 30-2, 30-3, 30-4) is designed to apply at least one of a group comprising: phase modulation, amplitude modulation, frequency modulation to said stimulus signals (S_c).

21. A system adapted for determining polarization dependent characteristic of an optical device under test (10) having at least one input and at least one output, comprising:

a signal application unit according to claim 18 or any one of the above claims, adapted for applying at least four stimulus signals (S_b-1, S_b-2, S_b-3, S_b-4) each having a characteristic identification and a different state of polarization as an input to the optical device under test (10), and

a determining system according to claim 15 or any one of the above claims, adapted for determining polarization dependent characteristic of the optical device under test (10).

22. A system adapted for determining polarization dependent characteristic of an optical device under test (10) having at least one input and at least one output, comprising at least one of the features:

- a signal source unit (4) adapted for providing at least one stimulus signal (S_a, S_b)

- at least four polarization units (40-1, 40-2, 40-3, 40-4), each adapted for receiving a respective stimulus signal, wherein each polarization unit (40-1, 40-2, 40-3, 40-4) is adapted for setting said respective stimulus signal (Sb-1, Sb-2, Sb-3, Sb-4) into a unique state of polarization;

- at least four modulation units (30-1, 30-2, 30-3, 30-4) for providing a different characteristic identification to each one of said uniquely polarized stimulus signals (Sc-1, Sc-2, Sc-3, Sc-4);

- a signal receiving unit (60, 70) adapted for receiving a response signal (Ra) from at least one output of said device under test (10) in response to the uniquely polarized stimulus signals (Sc-1, Sc-2, Sc-3, Sc-4), each having the respective characteristic identification, and being adapted to identify signal portions, each corresponding to a respective one of the stimulus signals, within said response signal (Ra),

- an evaluation unit (80) adapted for determining said polarization dependent characteristic of said device under test (10) by evaluating said signal portions of said received response signal (Rb).

23. The system according to claim 22,

wherein each of said modulation units (30-1, 30-2, 30-3, 30-4) is designed to apply a different modulation frequency to each of said

stimulus signals (S_C-1, S_C-2, S_C-3, S_C-4) that is input to said polarization units (40-1, 40-2, 40-3, 40-4).

24. The system according to claim 22 or any one of the above claims, wherein said signal receiving unit comprises at least one frequency selective filter (60) for identifying said modulation frequency of at least one of said uniquely polarized stimulus signals (S_C-1, S_C-2, S_C-3, S_C-4) as said identification within said response signal (R_a).

25. The system according to claim 22 or any one of the above claims, wherein said signal receiving unit comprises a sensor and a power meter (70) associated with each of said frequency selective filters (60) of said receiving unit.

26. The system according to claim 22 or any one of the above claims, wherein a number of four or more polarization units (40-1, 40-2, 40-3, 40-4) each being associated with one of said modulation units (30-1, 30-2, 30-3, 30-4) are input with said stimulus signal, each of said polarization units (40-1, 40-2, 40-3, 40-4) generating one of a set comprising four or more distinct and unique states of polarization of said stimulus signal.

27. The system according to claim 22 or any one of the above claims, wherein said polarization units (40-1, 40-2, 40-3, 40-4) are designed such that the power of each of said polarized stimulus signals to be applied to said input of said device under test (10) attains substantially the same value.

28. The system according to claim 22 or any one of the above claims, wherein said evaluation unit (80) comprises a control unit, a memory and a user interface for solving a linear equation system that is input with values provided by said signal receiving unit which comprises a power meter (70).

29. The system according to claim 22 or any one of the above claims, wherein said signal application unit comprises a wavelength tunable laser source (4).

30. The system according to claim 22 or any one of the above claims, wherein said signal application unit comprises a further polarization unit for setting said stimulus signal into a predetermined state of polarization prior to inputting said signal to said plurality of polarization units (40-1, 40-2, 40-3, 40-4).

31. An apparatus for polarization dependent analyzing an optical signal (6) transmitted through a DUT (10), comprising:

a first beam splitter (105) splitting the optical signal (6) into a first signal part (6a) having an initial first polarization, a second signal part (6b) having an initial second polarization, a third signal part (6c) having an initial third polarization and a fourth signal part (6d) having an initial fourth polarization,

a first modulator (27) coding the first signal part (16, 6a) using a first code (17, code 1),

a second modulator (29) coding the second signal part (20, 6b) using a second code (17, code 2),

a third modulator (127) coding the third signal part (6c) using a third code (code 3),

a fourth modulator (129) coding the fourth signal part (6d) using a fourth code (code 4),

a coupler (35, 135) connected to the modulators (27, 29, 127. 129), which is designed to reunite the coded signal parts (6a, 6b, 6c, 6d) and to provide the first (6a), the second (6b), the third (6c) and the fourth coded

signal parts (6d) to the DUT (10),

a detector (44, 46) detecting a DUT-signal (140) coming from the DUT (10) in response to the coded signal parts (6a, 6b, 6c, 6d),

a first correlator (52-1, 52-3) determining a first signal part (a, c) of the DUT-signal (140) corresponding to the first signal part (6a) by means of the first code (17, code 1), and

a second correlator (52-2, 52-4) determining a second part (b, d) of the DUT-signal (32, 140) corresponding to the second signal part (20, 6b) by means of the second code (17, code 2).

a third correlator (52-3) determining a third signal part (c) of the DUT-signal (140) corresponding to the third signal part (6c) by means of the third code (code 3), and

a fourth correlator (52-4) determining a fourth part (d) of the DUT-signal (140) corresponding to the fourth signal part (6d) by means of the fourth code (code 4).

32. The apparatus according to claim 31, further comprising

an evaluation unit adapted for determining said polarization dependent characteristic of said device under test from said first, said second, said third part and said fourth part of said DUT-signal.

33. A method of polarization dependent analyzing an optical signal (6) provided to a DUT (10), comprising the steps of:

splitting the optical signal (6) at least into a first signal part (16, 6a) having an initial first polarization, a second signal part (20, 6b) having an initial second polarization, a third signal part (6c) having an initial third polarization and a fourth signal part (6d) having an initial fourth

polarization,

coding the first signal part (6a) using a first code (17, code 1), coding the second signal part (6b) using a second code (19, code 2), coding the third signal part (6c) using a third code (code 3) and coding the fourth signal part (6d) using a fourth code (code 4),

providing the first (16, 6a), the second (20, 6b), the third (6c) and the fourth coded signal parts (6d) to the DUT (10),

detecting a DUT signal (140) coming from the DUT (10) in response to the coded signal parts (6a, 6b, 6c, 6d)) and

determining a first part (a, c) of the DUT-signal (140) corresponding to the first signal part (6a) by means of the first code (17, code 1) and determining a second part (b, d) of the DUT-signal (140) corresponding to the second signal (6b) by means of the second code (19, code 2) and determining a third part (c) of the DUT-signal (140) corresponding to the third signal part (6c) by means of the third code (code 3) and determining a fourth part (d) of the DUT-signal (140) corresponding to the fourth signal part (6d) by means of the fourth code (code 4).

34. Method of determining polarization dependent characteristic of an optical device under test having at least one input and at least one output, comprising the steps of:

- generating, splitting and inputting a stimulus signal (S_a, S_b) to each of at least four polarization units (30-1, 30-2, 30-3, 30-4);
- setting each of said input stimulus signals (S_b-1, S_b-2, S_b-3, S_b-4) into a unique state of polarization;
- attaching a characteristic identification portion to each of said input

and/or polarized stimulus signals (S_c-1, S_c-2, S_c-3, S_c-4);

- applying said stimulus signal (S_d-1, S_d-2, S_d-3, S_d-4) to said device under test (10) for effecting a response signal (R_a) of said device under test (10);

- receiving and identifying each of said characteristic identification portions from said response signal for tracing each of said polarized stimulus signals within said response signal;

- deriving a polarization dependent characteristic of said device under test from said traced polarized stimulus signals (R_b-1, R_b-2, R_b-3, R_b-4).

35. The method according to claim 34, wherein said characteristic identification portion is applied to said stimulus signal (S_c-1, S_c-2, S_c-3, S_c-4) by means of frequency, amplitude or phase modulation.

36. The method according to claim 34 or any one of the above claims, wherein said polarization dependent characteristic to be determined is represented by a characteristic polarization dependent loss / gain of power of said device under test (10).

37. The method according to claim 34 or any one of the above claims, wherein a set of at least four polarization units (30-1, 30-2, 30-3, 30-4) are employed to set said stimulus signal (S_b-1, S_b-2, S_b-3, S_b-4) each into a different state of polarization, and wherein each of said differently polarized stimulus signals (S_d-1, S_d-2, S_d-3, S_d-4) is applied to an input of said device under test while superimposing said polarized stimulus signals with each other.

38. The method according to claim 34 or any one of the above claims,

wherein

- four or more different states of polarization are generated and independently applied to said stimulus signal (S_b-1, S_b-2, S_b-3, S_b-4);
- the power of each of said polarized stimulus signals (S_d-1, S_d-2, S_d-3, S_d-4) as input to said optical device under test is measured;
- the power of each of said response signals (R_b-1, R_b-2, R_b-3, R_b-4) as identified and traced from said polarized stimulus signals(S_d-1, S_d-2, S_d-3, S_d-4) within said response signal by means of the respective identification portion, is measured;
- for each state of polarization, the power measured from said signals as input to (Sd-1, Sd-2, Sd-3, Sd-4) and as output from (Rb-1, Rb-2, Rb-3, Rb-4) said optical device (10) are compared with each other.

39. The method according to claim 34 or any one of the above claims, wherein the step of comparing the power measured from signals as input to (S_d-1, S_d-2, S_d-3, S_d-4) and as output from (R_b-1, R_b-2, R_b-3, R_b-4) said device under test (10) involves solving a linear equation system.

40. The method according to claim 34 or any one of the above claims, wherein said linear equation system is represented by a Mueller-Matrix.

41. A software program or product, preferably stored on a data carrier, for executing the method of any one of above claims, when run on a data processing system such as a computer.